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THE
BISON
OF
YELLOWSTONE
NATIONAL PARK

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MARGARET MARY MEAGHER



Summary

OBJECTIVES OF THIS STUDY were to provide basic data on the life history, habits, and ecology of bison in Yellowstone National Park.

The original population of bison in historic times consisted of mountain bison, *Bison bison athabasca*. In spite of poaching to near-extirmination by about 1901, a remnant of the subspecies survived and increased. Interbreeding with a population of plains bison, *B. b. bison*, introduced in 1902, began by the 1920s. The present bison population consists of hybrid descendants of the two subspecies.

The present wintering distribution within the park approximates that of the historic population, occurring in the three subunits of Lamar, Pelican, and Mary Mountain, none of which are geographically isolated from the others. The present summering population approximates the historic distribution only in the Upper Lamar-Mirror Plateau and Hayden Valley areas. A large west-side and a large northern summering population are lacking. Present (1968) numbers are half or less than those of probable historic numbers.

Examination of 71 females killed for population reduction purposes indicated that sexual maturity was not reached by most until 4 years of age, later than recorded some years ago. The observed pregnancy rate of 52% for females 2.5 years and older was also less than formerly recorded in Yellowstone. Brucellosis was not a factor which affected reproduction. Records and observations suggested that both calving season (in May on the winter ranges) and the breeding season (in late July to early August on the summer ranges) were shorter than formerly. The observed changes may reflect the shift from a semiranch population to a wild one.

Records from live-trapping operations in 1964-66 provided sex and age structure information. The records suggested that female survival was favored during the calf year, but that male survival was favored the next 3 years of life, after which differential survival could not be distinguished from the records. Adult bulls outnumbered adult cows, but this could be attributed to earlier reductions.

Age classes of the wintering population in the Mary Mountain area in 1964-65 were: calves, 16%; yearlings, 11%; 2.5-year-olds, 6%; 3.5-year-olds, 5%; and adults, 62%. These may change somewhat after a period with no reductions.

Observed spring calf percentages of mixed herd numbers for 3 of 5 years were 19-20%. Percentages of total population were approximately 11%. These percentages may also change if reductions are not made.

Significant mortality of calves at birth or just before or after was suggested by limited data. Thereafter, little mortality occurred during the first year. Nearly half the calves which survived into their first winter died before 2.5 years of age. Recruitment into the population occurred with survival to 3 years of age.

Population trends suggested that increases in the population were often very slow. Reductions by man apparently were not the sole factor which caused population decreases nor retarded increases. Parasites, diseases, predation, and emigration were not important. Environmental factors culminating in usual and more-than-usual winter mortality appeared important.

Herd groups followed definite patterns of seasonal movement. Spring migrations to summer ranges, occurring by the second week of June, appeared to be influenced by weather patterns and temperatures rather than snow melt or vegetation changes. Temporary fall movements occurred in conjunction with fall storms at higher elevations; final movements to winter ranges occurred by mid-November. Bull movements were somewhat more irregular.

Movements and distribution on summer range areas appeared more influenced by the presence of biting flies than by possible factors of breeding activity and vegetation changes. A species of *Symphoromyia* of the Rhagionidae was implicated.

Mixing and interchange between population subunits resulted in designation of three herds according to their use of winter range areas. These three subunits formed two breeding populations in summer. Little contact occurred between members of these two populations at any time.

The limited neckband information on marked adult cows suggested that they have an affinity for a given winter range regardless of summer movements. Temporary shifts of population segments from one winter range to another have occurred. Thus, although no population segment is isolated from another, the three exist as fairly separate entities in terms of winter range. This may explain the lack of population emigration to and reestablishment on unoccupied ranges either within or outside the park since historic times.

Analysis of 22 rumen samples showed that sedge was the most important forage item. Sedge, rush, and grasses provided 96% of the diet volume throughout the year. Forage availability did not appear to be a population-limiting factor under most conditions.

Population numbers in Pelican over a span of many years suggested that the levels were regulated by environmental influences which resulted in low reproduction and low increment rates. Larger increases in numbers during favorable periods have been offset periodically by heavy mortality during more severe winters. The minimum population level in this area may be governed by the presence of scattered thermal areas used in winter stress periods. A combination of factors such as extensive sedge bottoms together with some sagebrush-grassland uplands, open streams, and thermal areas may allow habitation over time by mixed herd groups of bison in this wintering valley.



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